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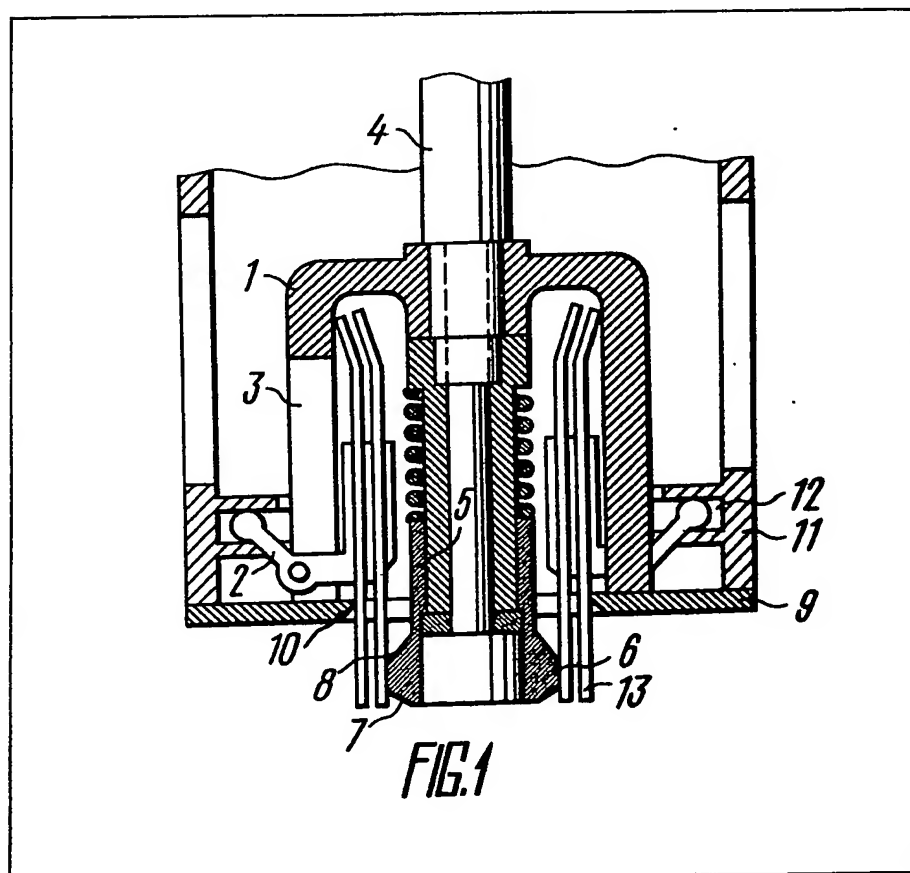
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(54) Apparatus for transferring set of winding sections into magnetic circuit slots

(57) An apparatus for transferring windings 13 from an assembly drum

(not shown) into armature slots comprises a housing 11 with a circular groove 12, a cup 1 with radial slots 3, the housing being axially movable with respect to the cup, and levers 2 each of which has one arm engaged with the groove, whereas the other arm of wedge section is installed in a slot. A spring-loaded sleeve 5 is located inside the cup and has a circular projection 6 with chamfers 7 and 8. A ring 9 has a guiding chamfer 10 and an inside diameter smaller than the inside diameter of the cup.

In use the apparatus is placed over a set of windings 13 assembled in the drum, positioning the windings accurately, then movement between cup 1 and housing 11 causes the levers 2 to grip the windings so that they can be removed from the holder and inserted into an armature.



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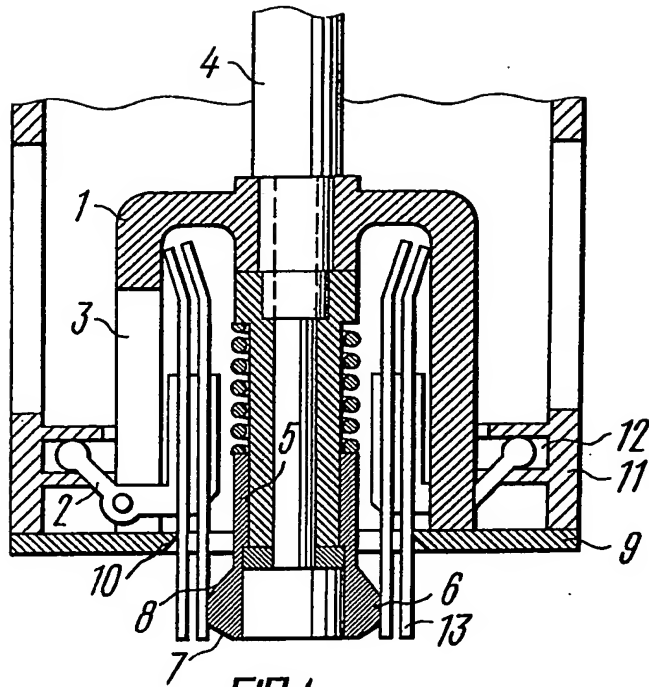


FIG. 1

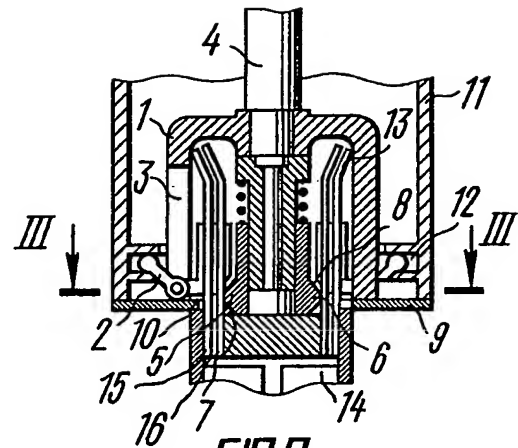


FIG. 2

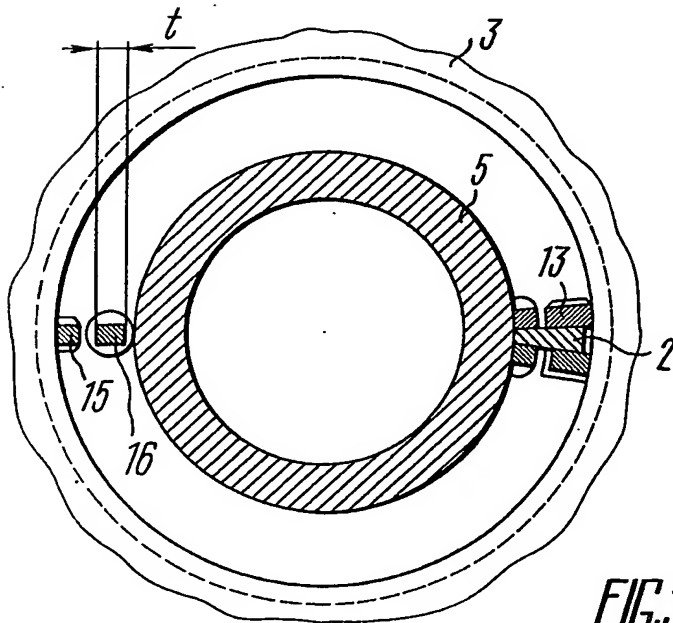


FIG. 3

## SPECIFICATION

**Apparatus for transferring set of winding sections from assembly drum into magnetic circuit slots**

- 5 The invention relates to apparatus for making, assembling, operating and repairing electric machines and has particular reference to an apparatus for transferring a set of winding sections from an assembly drum into magnetic circuit slots.
- 10 This invention may be used in the manufacture of armatures for automobile and tractor starters and other electric machines.
- 15 The invention provides an apparatus for transferring a set of winding sections from an assembly drum into magnetic circuit slots, comprising a housing with a circular groove, a cup with radial slots, the housing being axially movable with respect to the cup, and levers each of which has one arm thereof installed in the housing circular groove, whereas the other arm, wedge-shaped in cross section, is installed in the cup radial slot, the quantity of the levers corresponding to the quantity of the winding sections, and, according to the invention, further comprising a spring-loaded sleeve which is located inside the cup coaxially therewith and has a circular projection chamfered on either side, and a ring which has a guiding chamfer and the inside diameter of which is smaller than the inside diameter of the cup, the ring and the circular projection on the spring-loaded sleeve being situated outside the cup.
- 20 The invention provides enhanced operating reliability in assembling windings with magnetic circuits by virtue of increasing the accuracy of orientating the side parts of the winding sections in an assembly drum when engaging the set of the winding sections, whereby provision is made against the possibility of the winding sections being mutilated by the wedge-shaped parts of the levers due to parallel misalignment of the side parts of the winding sections in relation to the axis of the assembly drum and the axis of the apparatus. The accurate orientation makes for surely fitting the winding sections into the magnetic circuit slots. These advantages make it possible to reduce scrapping such a critical material as conductor copper, automatize the assembly process, increase operating efficiency and decrease the need for manual corrective operations, thereby improving operators' labour conditions.
- 25 For a better understanding of the invention, an embodiment will now be described by way of example with reference to the accompanying drawings, wherein:
- 55 *Figure 1* is a sectional view of an apparatus for transferring a set of winding sections from an assembly drum into magnetic circuit slots according to the invention;
- 60 *Figure 2* is a sectional view of an apparatus for transferring a set of winding sections from an assembly drum into magnetic circuit slots, showing it at the instant of engaging winding sections and orientating same in relation to slots and holes in an assembly drum according to the invention;
- 65 *Figure 3* is a cross sectional view on the line III-III

of *Figure 2* according to the invention.

- The apparatus for transferring a set of winding sections from an assembly drum into magnetic circuit slots is constructed as a cup 1 (*Figure 1*) with pivoted levers 2 installed in radial slots 3. The cup 1 is mounted on the end of a shaft 4. Installed inside the cup 1 coaxially therewith is a spring-loaded sleeve 5 adapted to freely move axially. The front part of the spring-loaded sleeve 5 has a circular projection 6 with chamfers 7 and 8 on either side thereof. The apparatus comprises a ring 9 with a guiding chamfer 10. The inside diameter of the ring 9 is smaller than the inside diameter of the cup 1. The cup 1 is installed inside a housing 11 having a circular groove 12. The housing 11 is mounted on the shaft 4, being movable with respect to the cup 1 along the axis thereof.

- One arm of each lever 2 is installed in the circular groove 12 in the housing 11, whereas the other arm, wedge-shaped in cross section, is installed in the radial slot 3 in the cup 1. The quantity of the levers 2 corresponds to the quantity of winding sections 13. The set of the winding sections 13 is engaged by the levers 2.

- 90 The ring 9 and the circular projection 6 are situated outside the cup 1.

- Referring to *Figure 2*, the apparatus for transferring a set of winding sections from an assembly drum into magnetic circuit slots is shown at the instant of engaging winding sections and orientating same in relation to slots 15 and holes 16 in assembly drum 14.

- Figure 3* shows a cross sectional view of the apparatus taken on the line III-III of *Figure 2*. The letter t indicates the cross sectional height of a conductor in the winding sections 13. The apparatus is shown in *Figure 3* at the instant when the winding section 13 is being engaged by the wedge-shaped part of the lever 2 and the inside and outside diameters of the set of the winding sections 13 are being orientated by means of the spring-loaded sleeve 5 and the ring 9.

The apparatus operates as follows:

- The set of the winding sections 13 installed in the assembly drum 14 (*Figure 2*) is delivered into the working zone so as to align the axis of the assembly drum 14 with the axis of the cup 1. Then the apparatus is lowered along the axis of the assembly drum 14. The front part of the spring-loaded sleeve 5 with the circular projection 6 enters the cylindrical space formed by the set of the winding sections 13. During further movement of the apparatus along the axis of the assembly drum 14, by reason of interaction between the inner side parts of the winding sections 13 and the circular projection 6, between the outer side parts of the winding sections 13 and the inner side of the ring 9, and also between the end parts of the winding sections 13 and the inner cylindrical surface of the cup 1, the axes of the side parts of the winding sections 13 gradually assume a position parallel with the axis of the assembly drum 14 and the cup 1. The mechanism of the process of orientating the winding sections 13 is depicted in *Figure 3* from which it is seen that the outside diameter of the circular projection 6 on the spring-

loaded sleeve 5 equals the outside diameter of the circle formed by the holes 16 in the assembly drum 14 (Figure 2) minus two cross sectional heights (2t) of the conductor in the winding sections 13 (Figure 5 3).

The inside diameter of the ring 9 equals the bottom diameter of the slots 15 provided in the assembly drum 14 (Figure 2) for the outer side parts of the winding sections 13 (Figure 3) plus two cross sectional heights of the conductor in the winding sections 13.

By reason of the aforesaid relationship, the side parts of the winding sections 13 are brought by the circular projection 6 on the spring-loaded sleeve 5 against the inner surface of the holes 16 in the assembly drum 14 (Figure 2) and the axes of the side parts of the winding section 13 assume a position parallel with the axis of the cup 1 and the assembly drum 14. The process of orientating the outer side parts of the winding sections 13 is analogous, but it is effected by reason of interaction with the ring 9 and the slot 15 (Figure 3) in the assembly drum 14 (Figure 2). After the orientation process is completed and the apparatus is lowered into position for engaging the winding sections 13, the housing 11 is lifted, whereby the wedge-shaped parts of the levers 2 are introduced between the side parts of the winding sections 13 to grip them. Thereafter the apparatus is raised together with the set of the winding sections 13, whereas the spring-loaded sleeve 5 with the circular projection 6 lowers and aligns the standing out side parts of the winding sections 13 on their inside diameter. Then the set of the winding sections 13 is transferred by means of the apparatus to a magnetic circuit where the winding sections 13 are introduced into the magnetic circuit slots, the orientated projecting ends going first. Thereupon the apparatus is returned into the initial position.

Thus, the apparatus of the present invention provides enhanced operating reliability in assembling windings with magnetic circuits by virtue of increased accuracy of orientating the winding sections in relation to the magnetic circuit slots. This makes it possible to reduce scrapping such a critical material as conductor copper, automatize the assembly process, increase operating efficiency and improve operators' labour conditions.

## 50 CLAIMS

1. An apparatus for transferring a set of winding sections from an assembly drum into magnetic circuit slots, comprising a housing with a circular groove, a cup with radial slots, the housing being axially movable with respect to the cup, levers each of which has one arm thereof installed in the housing circular groove, whereas the other arm, wedge-shaped in cross section, is installed in the cup radial slot, the quantity of the levers corresponding to the quantity of the winding sections, a spring-loaded sleeve which is located inside the cup coaxially therewith and has a circular projection chamfered on either side, and a ring which has a guiding chamfer and the inside diameter of which is

smaller than the inside diameter of the cup, the ring and the circular projection on the spring-loaded sleeve being situated outside the cup.

2. An apparatus for transferring a set of winding sections from an assembly drum into magnetic circuit slots, substantially as described herein with reference to and as shown in the accompanying drawings.

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